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Patent Application

of

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Flashing and Mounting Bracket for a Skylight

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Title of the Invention

Flashing and Mounting Bracket for a Skylight

Background

Skylights and roof windows are popular features in commercial and residential buildings, allowing the illumination of rooms with natural light and thereby reducing the consumption of electricity associated with lighting rooms through electric power. In addition to enhancing the illumination of rooms, skylights and roof windows increase the perceived interior roominess of a structure to a higher degree than through the use of vertical windows in walls. Skylights and roof windows may also be configured to enhance the air circulation through a room.

In some contexts, the term "skylight" may be used to refer to a window structure typically out-of-reach of occupants of a building, and not configured to open entirely for cleaning; the term "roof window" may be used to refer to a window structure typically within the reach of occupants of the building, such as in a "living attic" or "bonus room" over a garage, and configured to facilitate cleaning of the exterior pane from inside the building. However, for purposes of this description and disclosure, the term "skylight" will be used herein to refer to both types of products, it being understood that the invention herein as referenced to a "skylight" equally applies to a "roof window."

Skylights are installed in original building construction, but also are installed in existing buildings as improvements. Because skylights act as a barrier to outside elements, accurate mounting and sufficient sealing of skylights may be desirable in order to ensure proper functioning.

The opening for a skylight in a building roof extends through the entirety of the roof thickness, including the interior building ceiling and all structures, such as roof joists, between the exterior roofing surface and the interior ceiling surface. For structural and aesthetic purposes, framing and sheet rocking may be employed in order to form finished sidewalls that extend between the ceiling and the roof.

As a component in the exterior building envelope, a skylight assembly needs to be configured to prevent the unwanted intrusion of the elements, such as rain and wind, from entering the building. Furthermore, a skylight needs to be configured to manage water vapor that may condense on the interior side of the skylight pane, which, if not controlled, may flow to adjacent sheetrock or wood, leading to undesirable discoloration or deterioration of such adjacent materials.

It is known in the art to provide mounting brackets on the side pieces of the frame of the skylight. One such skylight having mounting brackets is disclosed in U.S. Patent No. 4,920,713 to Borresen et al., the entire disclosure of which is incorporated by reference herein in its entirety for all purposes. In the '713 patent, mounting screws or mounting nails may be inserted through the mounting bracket and driven into the sheathing, rafters, or other structure in order to secure the skylight to the roof of the building. When driving mounting screws or mounting nails into rafters, the '713 patent is dependent upon a consistent and uniform distance between adjacent rafters. Further, the skylight and mounting brackets disclosed in the '713 patent may also only be secured to rafters when the skylight and mounting brackets are sized for a particular amount of space between adjacent rafters.

In order to provide for proper sealing of the skylight, flashing is used in order to help create a seal against moisture and other elements. One such type of seal is disclosed in U.S. Patent No. 4,972,638 to Minter, the entire disclosure of which is incorporated by reference herein in its entirety for all purposes. Such flashing suffers from the disadvantage of being made of a completely flexible elastomeric material, which may be advantageous for positioning but disadvantageous for effective sealing when compared to a rigid flashing. As such, current flashing designs incorporate either a completely rigid or a completely flexible flashing,

hence gaining the advantages but also suffering the disadvantages associated with either particular type of flashing.

The present invention improves upon currently known mounting brackets and flashing for skylights and provides for an improved skylight that prevents the unwanted transfer of rain, wind, heat and the like both into and from the interior of the building. The present invention provides for flashing for use with a skylight, mounting brackets for use with a skylight, and the combination of flashing and mounting brackets for use with a skylight.

Summary

Various features and advantages of the invention will be set forth in part in the following description, or may be obvious from the description.

The present invention provides for a skylight that has a mounting bracket for installation on a roof of a building. The skylight includes a frame that defines an interior opening and has a plurality of elements. The mounting bracket has a first and second leg. The first leg is connected to one of the elements of the frame. The second leg has a guide structure that has at least one opening that extends at an angle to the second leg.

In accordance with one exemplary embodiment of the present invention, the guide structure has an inclined portion and at least one opening located thereon. Alternatively, the guide structure may include at least one bushing element with at least one opening therein. Further, the present invention provides for an alternative exemplary embodiment where the guide structure is a portion of the second leg that has an enlarged thickness in which the opening of the guide structure is located in the portion of the second leg that has an enlarged thickness.

The present invention also provides for a skylight as described above with which the mounting bracket has an alignment means that may have at least one alignment opening. Additionally, in accordance with other exemplary embodiments of the present invention, the alignment means may be a plate or leg that is connected to the first leg and is substantially parallel to the first leg. In accordance with other alternative exemplary embodiments of the present invention, an alignment portion may be provided that is movable from a position in which it is

non-parallel to the first leg to a position in which it is substantially parallel to the first leg.

The present invention also provides for a skylight with a flashing profile for installation on a roof. The skylight includes a frame that defines an interior opening and has a plurality of elements. A flashing profile is provided and has a rigid section that is made of a first and second flashing leg. The first flashing leg is connected to, or is adjacent to, one of the elements of the frame. The flashing profile has a flexible section that is attached to the second flashing leg of the rigid section. A rigid flashing profile is also provided and is connected to one of the elements of the frame. The flashing profile and the rigid flashing profile extend along the lengths of two different elements of the frame.

The present invention also provides for a skylight where the second flashing leg has a raised folded portion, and where an end of the flexible section is attached to the raised folded portion. In accordance with other exemplary embodiments of the present invention, this attachment may be made by crimping, adhesion, or a combination of crimping and adhesion.

The present invention also provides for an exemplary embodiment as discussed above where an end of the raised folded portion is turned down such that the end is substantially perpendicular with the first flashing leg. Alternatively or additionally, the skylight may be configured in which the raised folded portion, the first flashing leg, and the second flashing leg define a channel for the drainage of water.

The present invention also provides for a skylight that has both a flashing profile and a mounting bracket. The skylight includes a frame that defines an interior opening with a plurality of elements that each extend in a longitudinal direction. A mounting bracket is included and has a first and second leg. The first leg is connected to, or is adjacent to, one of the elements of the frame, and the second leg has a guide structure with at least one opening that extends at an angle with respect to the second leg. A flashing profile is included and has a rigid section that is made of a first and second flashing leg. The first flashing leg is connected to one of the elements of the frame. The flashing profile also has a flexible section that is attached to the second flashing leg of the rigid section. The

first leg of the mounting bracket is disposed between the element of the frame and the first flashing leg of the flashing profile.

The present invention also provides for an exemplary embodiment of the skylight as discussed above where a rigid flashing profile is included and is connected to one of the elements of the frame. The rigid flashing profile and flexible flashing profile extend along the longitudinal lengths of two different elements of the frame.

Brief Description of the Drawings

Fig. 1 is a perspective view of a skylight having a mounting bracket and prepared for installation on a roof of a building.

Fig. 2 is a perspective view of an exemplary embodiment of a mounting bracket used in accordance with the present invention.

Fig. 3 is a cross-sectional view taken along line III-III of Fig. 2

Fig. 4 is a perspective view of an exemplary embodiment of a mounting bracket used in accordance with the present invention.

Fig. 5 is a cross-sectional view taken along line V-V of Fig. 4.

Fig. 6 is a perspective view of an exemplary embodiment of a mounting bracket used in accordance with the present invention.

Fig. 7 is a cross-sectional view taken along line VII- VII of Fig. 6.

Fig. 8 is a perspective view of an exemplary embodiment of a mounting bracket used in accordance with the present invention. The mounting bracket has a separate guiding element engageable therewith.

Fig. 9 is a front plan view of the guiding element of Fig. 8.

Fig. 10 is a partial cross-sectional view of an exemplary embodiment of a skylight in accordance with the present invention. The skylight includes a flashing profile that has a flexible section.

Fig. 11 is a perspective view of a skylight with a mounting bracket used in accordance with one exemplary embodiment of the present invention. The skylight is prepared for installation on a roof of a building.

Fig. 12 is a perspective view of an exemplary embodiment of a mounting bracket used in accordance with the present invention.

Fig. 13 is a partial cross-sectional view of a skylight having a flashing profile with a flexible section in accordance with one exemplary embodiment of the

present invention. The skylight includes a mounting bracket that has an alignment portion.

Fig. 14 is a perspective view of an exemplary embodiment of a skylight used in accordance with the present invention. The skylight is prepared for installation on a roof of a building.

Fig. 15 is a perspective view of an exemplary embodiment of a mounting bracket used in accordance with the present invention. The mounting bracket includes an alignment means.

Fig. 16 is a partial cross-sectional view of an exemplary embodiment of a skylight used in accordance with the present invention. The skylight has a flashing profile that includes a flexible section, and has a mounting bracket that includes an alignment means.

Fig. 17 is a perspective view of a skylight in accordance with one exemplary embodiment of the present invention. The skylight has a flashing profile located on each of the side elements of the frame of the skylight, and has a rigid flashing profile located on the top and bottom elements of the frame.

Fig. 18 is a partial cross-sectional view of the skylight of Fig. 17 installed on a sheathing and a rafter.

Detailed Description

Hereinafter provided is a detailed description of various exemplary embodiments of the present invention, some of which are presented in the drawings of the present application. Other exemplary embodiments of the present invention are described in the following detailed description.

Fig. 1 illustrates a skylight frame 1 including a plurality of elements, in the embodiment shown four elements, namely bottom element 2, two side elements 3 and 4, and top element 5. Throughout the within description it is noted that the terms "bottom", "side" and "top" are for orientation only, referring to an installation of the skylight in an inclined roof; however, such terms may also be used for orientation purposes in understanding the invention as relating to an installation on a non-inclined roof. Additionally, it is to be understood that any number of elements comprising various shapes may be used to form the skylight frame 1 in various exemplary embodiments of the present invention. It should be appreciated

that while Fig. 1 depicts miter joints between the elements, such is for illustration purposes only and connections between the plurality of elements may be any type of joint, such as butt joint, mortise and tenon joint, rabbit joint, or dovetail joint. It should be further appreciated that skylight frame 1 may include no joints in the case of skylight frame 1 being a frame formed by injection molding or other similar processes.

At the installation site shown in Fig. 1, a sheathing 6, made for example from plywood, resides on an underlying supporting structure comprising a number of rafters 7 which are normally positioned with a predetermined spacing between adjacent rafters 7. In sheathing 6, an aperture 8 corresponding substantially to the outer dimensions of skylight frame 1 is prepared prior to placing a skylight (not shown) on sheathing 6. Headers 7' and 7" may also be installed between adjacent rafters 7 for use in constructing a finished interior light shaft beneath the skylight. The skylight is placed in such a way that side elements 3 and 4 of skylight frame 1 extend substantially in parallel with rafters 7, and is subsequently mounted on the roof surface and anchored to the supporting structure in a manner that will be described in further detail in the following. The skylight furthermore may comprise a glass-carrying frame or sash (not shown) connected with skylight frame 1, for instance by hinge joints. In its position of use, i.e. when the installation has been completed, exterior cladding (not shown) protects the skylight against weather, and a flashing arrangement connected with, or adjacent to, the skylight frame provides a substantially weather-tight transition to the surrounding roofing as will be described in further detail hereinbelow.

In the exemplary embodiment shown in Fig. 1, two mounting brackets generally designated 11 are fastened to one side element 4 and two mounting brackets (not shown) are fastened to the other side element 3. The arrangement of further mounting brackets 11 on the other skylight elements 2, 5 and other configurations with respect to the individual positions of the mounting brackets 11 may be employed if desired.

Referring now to Figs. 2 and 3, a preferred exemplary embodiment of mounting bracket 11 is shown. Each mounting bracket 11 comprises a first leg 14 and a second leg 15 extending at a substantially right angle to first leg 14 and in connection therewith. First leg 14 is provided with a plurality of openings 12 for

receiving a fastener, not shown, such as nails or screws, that are driven into the outer side wall of a respective side element 3, 4. It is to be understood that other types of fasteners may be employed in accordance with the present invention. For example, bolts, staples, brads, or adhesives may also be used. Furthermore, in the case of skylight frame 1 being formed by injection molding or similar processes, first leg 14 may be attached to skylight frame 1 by heat riveting, heat welding, or being formed within the skylight frame 1. At a distance from the connection with the first leg 14, the second leg 15 is provided with openings 16, 17 for receiving a mounting means, not shown, in the form of mounting nails, screws, bolts, brads, staples, and the like. In order to ensure that such mounting means are anchored in the underlying supporting structure, i.e. rafters 7 in Fig. 1, these openings 16, 17 are provided in an inclined portion 18 of second leg 15. Hence, inclined portion 18 incorporating openings 16, 17 constitutes a guide structure for ensuring that the mounting nails or screws are driven into rafter 7, even in the case in which openings 16, 17 are placed at a considerable distance from the connection between first and second legs 14, 15.

Advantageously, openings 16, 17 extend at substantially right angles to inclined portion 18. Furthermore, openings 16, 17 may be provided with a recess or countersunk portion surrounding each opening 16, 17. The inclination of the inclined portion 18 with respect to the plane of second leg 15 may vary, typical examples being an angle of inclination of 30° - 60°. Alternatively, angles of inclination of 10°, 20°, 70°, and 80° may be used in other exemplary embodiments of the present invention. In the exemplary embodiment shown in Fig. 2, the portions of second leg 15 positioned on opposite sides of inclined portion 18 are in the same plane, achieved by forming second leg 15 with a corresponding inclined portion 19 which adjoins inclined portion 18 at apex 19a. Alternatively, the portions of second leg 15 positioned on opposite sides of inclined portion 18 may reside in substantially parallel planes but not in the same plane, with the plane of second leg 15 closer to first leg 14 higher than the other plane (not shown), for example by one millimeter, to increase the size of inclined portion 18 relative to inclined portion 19. Optionally, second leg 15 may also include other openings (not shown) in addition to openings 16, 17 for receipt of temporary nails or screws, to allow for temporary securement of the skylight to the roof during installation until final

positioning is achieved and openings 16, 17 are then used for receipt of permanent nails, screws, and the like, whereupon the temporary nails or screws may be removed.

In the exemplary embodiment shown in Figs. 4 and 5, a mounting bracket, generally designated 21, comprises a first leg 24 including openings 22 for receiving a fastener, and a second leg 25 which is provided with a guide structure in the form of bushing elements 28 and 29. Bushing element 28 and 29 may be of steel, aluminum, or other metal; alternatively, bushing element 28 and 29 may be of plastic, nylon, or other non-metals such that, during installation of the skylight upon a roof, bushing element 28 and 29 will serve to guide fasteners at a predetermined angle as the fastener is driven into the roof but will thereafter crush to a flatter profile upon full seating of the fastener (such as, for example, from blows of a hammer driving a nail fastener to full seating). Each bushing element 28 and 29 includes an obliquely extending opening 26 and 27, respectively, and is accommodated in a corresponding aperture (not shown in detail) in second leg 25. The openings 26 and 27 extend in a predetermined angle with respect to the plane of second leg 25 through respective bushing elements 28 and 29. Such predetermined angle and the orientation of such obliquely extending openings 26 and 27 may be preserved by shaping bushing element 28 and 29 rectangularly such that rotation of bushing element 28 and 29 within second leg 25 is resisted. As in the above exemplary embodiment, the value of the predetermined angle may vary, such angle may be dependent on the length of second leg 25 in various exemplary embodiments of the present invention.

In the exemplary embodiment shown in Figs. 6 and 7, a mounting bracket 31 comprises a first leg 34 with a number of openings 32 and a second leg 35. The guide structure of this exemplary embodiment comprises a portion of a second leg 35 being formed to provide space between such portion and sheathing 6. In second leg 35, openings 36 and 37 are provided, which extend in a predetermined angle through second leg 35. In one exemplary embodiment of the present invention, countersunk recesses may be provided for openings 36 and 37 for receipt of fastener heads such as nailheads and screwheads.

In the exemplary embodiment shown in Fig. 8, a mounting bracket 41 includes a first leg 44 with openings 42 and a second leg 45. Apertures 48 and 49

are provided in second leg 45. The guide structure comprises a separate guiding element 50. Guiding element 50 has an inclined body portion 53 with a leg 51 protruding from the bottom of inclined body portion 53 at an edge thereof for temporary abutment with an edge 45a of second leg 45. Guiding element 50 is provided with obliquely extending openings 46 and 47 which extend in a predetermined angle through inclined body portion 53.

Following positioning of guiding element 50 with leg 51 in abutment with edge 45a, the mounting means in the form of nails, screws, bolts, or the like, are inserted and driven into adjacent mounting bracket 41 structure to a certain extent in order to secure an appropriate insertion angle. When the mounting means are appropriately engaged to the structure, guiding element 50 is removed from mounting bracket 41. This removal is made possible by the provision of keyhole-shaped sections 46a and 47a adjoining openings 46 and 47. During this removal operation, guiding element 50 is moved along edge 45a and subsequently away in a direction substantially perpendicular to edge 45a. Once guiding element 50 has been removed, the driving of mounting screws or nails may be completed to fully seat them. Guiding element 50 may then be utilized for securing the other mounting brackets 41 of the skylight frame 1 (Fig. 1) to the supporting structure such as sheathing 6 (Fig. 1).

In the exemplary embodiment shown in Fig. 10, a number of mounting brackets 11 of the exemplary embodiment of Figs. 2 and 3 have been fastened to skylight frame side piece 4. First leg 14 of each mounting bracket 11 is received in a recess 4a of skylight frame side piece 4. Although Fig. 10 shows the side piece 4 have the recess 4a, it is also possible in accordance with the present invention to provide a skylight frame side piece 4 without the recess 4a. In such an instance, the mounting bracket 11 or other components may be mounted flush against the skylight frame side piece 4. A portion of second leg 15 of mounting bracket 11 rests on sheathing 6 as shown (or on tarpaper atop sheathing 6, not shown), which in turn rests on rafter 7. A mounting nail 20 is inserted through each of the openings (not shown in detail) of the guide structure including inclined portion 18 (Fig 2) and is driven through sheathing 6 and into rafter 7.

As shown in Fig. 10, side piece 4 may have a non-rectangular cross-section so as to accommodate other components of the skylight system such as panes of

glass, interior sheetrock, and the like. For illustration purposes, Fig. 10 also, however, depicts cross-section 4', so that side piece 4 may be understood to correspond to side element 4 in Fig. 1, side element 104 in Fig. 11, and such others of the appended Figures in which the skylight frame is depicted simply as having members of rectangular cross-section.

In order to obtain a substantially weather-tight connection between the skylight and the surrounding roofing, a flashing arrangement is provided. The flashing arrangement comprises a substantially L-shaped flashing profile 9 extending along at least the length of side piece 4 of skylight frame 1, of which a first leg 9a is positioned in abutment with the outer wall of skylight frame side piece 4, and thus overlaps first leg 14 of mounting bracket 11. A second leg 9b of flashing profile 9 is disposed above second leg 15 of mounting bracket 11 and includes a raised folded portion 9c which together with the first leg 9a forms a channel 99 for transporting water along skylight frame side piece 4 of skylight frame 1.

A flexible section 10 is retained on one end in the raised folded portion 9c. For instance, the flexible section 10 may be retained in the raised folded portion 9c by crimping, adhesion, or by a combination of crimping and adhesion. As such, the flexible section 10 and the raised folded portion 9c may be crimped along the entire length of the flashing profile 334, 338 (depicted in Fig. 17, explained in more detail hereinbelow) or along any amount of length thereof. In accordance with one exemplary embodiment of the present invention, the flexible section 10 is crimped along the entire length of the flashing profile 334, 338 (Fig. 17) except for the last 6 inches on the ends of the flashing profile 334, 338. The flexible section 10 may be made of natural or synthetic rubber, elastomeric, or polymeric material. Due to the flexibility of flexible section 10, the entire flashing arrangement and mounting brackets 11 may be pre-mounted on the skylight frame 1. During mounting of such a skylight frame 1, flexible section 10 is lifted as indicated in Fig. 10, which will reveal and provide access to mounting bracket 11. The mounting means may then be inserted through the openings (not shown in detail) of the guide structure of second leg 15 of each mounting bracket 11 as described above. When mounting means have been driven into the underlying roof supporting structure, flexible section 10 is released and is brought to a position which substantially overlaps the

entire length of second leg 15 of mounting bracket 11. Subsequently, roofing shingles (not shown) may be mounted over the flexible section 10.

Fig. 11 is an exemplary embodiment of the present invention having a majority of components as previously described with respect to Fig. 1, but with reference numerals in the 100's that correspond to the reference numerals of like components in Fig. 1. The exemplary embodiment shown in Fig. 11 may be made as that previously described with respect to Fig. 1.

Referring now to Fig. 12, each mounting bracket 111 comprises a first leg 114 and a second leg 115 extending at substantially right angles from the lower edge of first leg 114 and in integral connection therewith. First leg 114 is provided with a plurality of openings 112 for receiving a fastener, not shown, such as nails or screws. The fastener may be driven into the outer wall of respective side elements 103, 104.

At a distance from the connection with first leg 114, second leg 115 is provided with openings 116, 117 for receiving mounting means (not shown) in the form of mounting nails or screws or the like. In order to ensure that skylight frame 101 is positioned correctly with respect to aperture 108, and furthermore to ensure that the skylight does not move substantially from this position or slide off the roof during installation in the event of inclined roof surfaces, at least some of the mounting brackets 111 are provided with alignment means. In the exemplary embodiment shown, the alignment means include a plate member 160 formed integrally with the remaining parts of the mounting bracket 111, those being first and second legs 114, 115. Plate member 160 may reside in the same plane as first leg 114 (not shown), or may reside in a substantially parallel plane as shown in Fig. 12. In plate member 160 a plurality of alignment openings are provided, one such alignment opening 161 is shown.

In Fig. 13, the mounting bracket 111 of the exemplary embodiment of Fig. 12 has been fastened to the skylight frame side piece 104. First leg 114 of each mounting bracket 111 may be received in a recess 104a of skylight frame side piece 104; however, it is also possible in accordance with the present invention to provide a skylight frame side piece 104 without recess 104a. In such an instance, the mounting bracket 111 or other components may be mounted flush against the skylight frame side piece 104. Alignment means 160 may be used to align the

skylight with respect to aperture 108 in that the alignment means 160 extend below the plane of sheathing 106; alignment means 160 will extend into aperture 108, allowing the skylight to be aligned with respect to aperture 108 in that alignment means 160 will abut sheathing 106, rafters 107, or headers 7', 7" (Fig. 1) to prevent the skylight from moving upon the plane of the roof. Following alignment of the skylight with respect to the aperture 108 by means of alignment means 160, second leg 115 of mounting bracket 111 rests on sheathing 106. Sheathing 106 in turn rests on rafter 107. A mounting nail 120 is inserted through each of the alignment openings 116, 117 (Fig. 12) and is driven through sheathing 106 and into rafter 107.

In order to obtain a substantially weather-tight connection between the skylight and the surrounding roofing, a flashing arrangement is provided. The flashing arrangement comprises a substantially L-shaped flashing profile 109 extending along at least the length of skylight frame side piece 104 of skylight frame 101. A first leg 109a is positioned in abutment with the outer wall of skylight frame side piece 104, and thus overlaps first leg 114 of mounting bracket 111. A second leg 109b of flashing profile 109 is disposed above second leg 115 of mounting bracket 111 and includes a raised folded portion 109c which together with first leg 109a forms a channel 199 for transporting water along skylight frame side piece 104 of skylight frame 101.

A flexible section 110 is retained on one end in the raised folded portion 109c. For instance, the flexible section 110 may be retained in the raised folded portion 109c by crimping, adhesion, or by a combination of crimping and adhesion. As such, the flexible section 110 and the raised folded portion 109c may be crimped along the entire length of the flashing profile 334, 338 (Fig. 17) or along any amount of length thereof. In accordance with one exemplary embodiment of the present invention, the flexible section 110 is crimped along the entire length of the flashing profile 334, 338 (Fig. 17) except for the last 6 inches on the ends of the flashing profile 334, 338. Due to the flexibility of flexible section 110, the entire flashing arrangement and mounting brackets 111 may be pre-mounted on the skylight. During mounting of such a skylight, the flexible section 110 is lifted as shown in Fig. 13, which will reveal and provide access to mounting bracket 111. The mounting means may be inserted through the alignment openings 116, 117

(Fig. 12) of second leg 115 of each mounting bracket 111 as described above. Once mounting means are driven into the underlying roof supporting structure, the flashing profile 110 is released and is brought to a position in which it substantially overlaps the entire length of second leg 115 of mounting bracket 111. Alignment portion 160 abuts the edge of sheathing 106 and a vertical side of rafter 107. The skylight may be additionally secured to the underlying roof structure by the insertion of mounting nails 162 through openings 161 in the alignment portion 160. Fig. 13 shows mounting nail 162 inserted through opening 161 and extending into rafter 107.

Fig. 14 is an exemplary embodiment of the present invention as previously described with respect to Fig. 1, but with reference numerals in the 200's that correspond to the reference numerals of like components in Fig. 1. The exemplary embodiment shown in Fig. 14 may be made as that previously described with respect to Fig. 1.

Referring now to Fig. 15, each mounting bracket 211 comprises a first leg 214 and a second leg 215 extending at substantially right angles from a lower edge of first leg 214 and in integral connection therewith by transition portion 214a. First leg 214 is provided with a plurality of openings 212 for receiving a fastener, not shown, such as nails or screws, that may be driven into the outer wall of respective side elements 203, 204. At a distance from the connection with first leg 214, second leg 215 is provided with openings 216, 217 for receiving mounting means, not shown, in the form of mounting nails or screws.

In order to ensure that the mounting means are anchored in the underlying supporting structure, for instance rafters 207 in Fig. 14, openings 216, 217 are provided in an inclined portion 218 of second leg 215. Therefore, inclined portion 218 incorporates openings 216, 217 and serve to guide the mounting nails or screws into rafter 207, even in the case in which openings 216, 217 are placed a considerable distance from the connection between first and second legs 214, 215.

Advantageously, the openings 216, 217 may extend at a substantially right angle to inclined portion 218. Furthermore the openings may be provided with a recess or countersunk portion surrounding each opening 216, 217 for receipt of nailheads or screwheads. The inclination of inclined portion 218 with respect to the plane of second leg 215 may vary, typical examples being an angle of

inclination of 30° - 60°. Alternatively, angles of inclination of 10°, 20°, 70°, and 80° may be used in other exemplary embodiments of the present invention. In the exemplary embodiment shown in Fig. 15, the portion of second leg 215 positioned beyond inclined portion 218 may be in the same plane as the portion on the opposite side of inclined portion 218, or may be in a substantially parallel plane. This is achieved by forming second leg 215 with a corresponding inclined portion 219 which adjoins inclined portion 218 at apex 219a.

In order to ensure that skylight frame 201 is aligned, that is positioned correctly with respect to aperture 208, at least some of the mounting brackets 211 are provided with alignment means, generally designated 260. The alignment means 260 also help ensure that the skylight does not move substantially from the aligned position or slide off of the roof in case of inclined roof surfaces. In the exemplary embodiment shown, alignment means 260 include an alignment portion 265 connected with first leg 214 by means of a connecting portion 267 and a flap 266. In the alignment portion 265, an alignment opening 261 is provided. In Fig. 15, alignment portion 265 assumes a transportation position in which it is substantially parallel with second leg 215 of mounting bracket 211.

Referring now to both Fig. 15 and Fig. 16, a number of mounting brackets 211 of the exemplary embodiment of Fig. 15 have been fastened to skylight frame side piece 204 in such a manner that first leg 214 of each mounting bracket 211 is received in a recess 204a of skylight frame side piece 204. However, it is also possible in accordance with the present invention to provide a skylight frame side piece 204 without recess 204a; in such an instance, the mounting bracket 211 or other components may be mounted flush against the skylight frame side piece 204. The alignment means 260 of mounting bracket 211 is brought from the transportation position to an installation position by swinging alignment portion 265 in a bending operation about connecting portion 267. Aperture 264 may be provided, for receipt of the tip of a screwdriver or other tool to be used for leverage to swing alignment portion 265 from the transportation position to an installation position. The connecting portion 267 is bent at an angle of substantially 90° until the alignment portion 265 assumes a position substantially parallel with first leg 214 of mounting bracket 211 defining an installation position. Due to the position of connecting portion 267 relative to second leg 215, alignment portion 265 is

slightly displaced with respect to first leg 214. During this bending or swinging operation, connecting portion 267 undergoes a permanent deformation. Following alignment of the skylight with respect to the aperture 208 by use of alignment means 260, a portion of second leg 215 of mounting bracket 211 rests on sheathing 206. Sheathing 206 in turn rests on rafter 207. A mounting nail 220 is inserted through each of the openings 216, 217 (Fig. 15) of inclined portion 218 and is driven through sheathing 206 and into rafter 207.

In order to obtain a substantially weather-tight connection between the skylight and the surrounding roofing, a flashing arrangement is provided. The flashing arrangement comprises a substantially L-shaped flashing profile 209 extending along at least the length of side element 204 of skylight frame 201. A first leg 209a is positioned in abutment with the outer wall of skylight element 204, and thus overlaps first leg 214 of mounting bracket 211.

A second leg 209b of flashing profile 209 is disposed above second leg 215 of mounting bracket 211 and includes a raised folded portion 209c which together with first leg 209a forms a channel 299 for transporting water along side element 204 of skylight frame 201. A flexible section 210 is retained on one end in the raised folded portion 209c. For instance, the flexible section 210 may be retained in the raised folded portion 209c by crimping, adhesion, or by a combination of crimping and adhesion. As such, the flexible section 210 and the raised folded portion 9c may be crimped along the entire length of the flashing profile 334, 338 (depicted in Fig. 17, explained in more detail hereinbelow) or along any amount of length thereof. In accordance with one exemplary embodiment of the present invention, the flexible section 10 is crimped along the entire length of the flashing profile 334, 338 (Fig. 17) except for the last 6 inches on the ends of the flashing profile 334, 338.

During installation, the alignment portion 265 abuts the edge of sheathing 206 and the vertical side of rafter 207. A mounting nail 262 (or screw, not shown) may be inserted through alignment opening 261 into rafter 207, the mounting nail 262 (or screw, not shown) may therefore be used both to align the skylight and also to further secure the skylight to the underlying roof structure. Due to the flexibility of flexible section 210, the entire flashing arrangement and mounting brackets 211 may be pre-mounted on the skylight frame. Upon installation on a

roof of such a skylight, the flexible section 210 may be lifted as indicated in Fig. 16, following which the mounting means may be inserted through openings 216, 217 (Fig. 15) of inclined portion 218 of second leg 215 of each mounting bracket 211 as described above. After the mounting means are driven into the underlying roof supporting structure, flexible section 210 may be released and brought to a position in which it substantially overlaps the entire length of second leg 215 of mounting bracket 211.

An additional exemplary embodiment of the present invention is shown in Fig. 17, in which the skylight is provided with a rigid flashing profile 332 may be attached to, or disposed adjacent to, a top element 348 of the skylight 352. Additionally, a rigid flashing profile 336 may be attached to, or disposed adjacent to, the bottom element 346 of the skylight 352. A flexible flashing profile 310L is attached to the side element 342L, and a flashing profile 310R is attached to the side element 342R. Provision of the rigid flashing profile 332, 336 at the top and bottom of the skylight 352 is beneficial in that the rigid flashing profile 332 may be positioned under shingles or other roofing elements that provide for a substantially weather-tight connection and rigid flashing profile 336 may be positioned over shingles or other roofing elements. Provision of the flexible flashing profiles 310L and 310R on the sides of the skylight 352 allows for pre-installation of the mounting brackets to skylight 352 and access thereto during installation of skylight 352 upon a roof.

Fig. 18 shows a partial cross-sectional view of the skylight 352 of Fig. 17 installed on a sheathing 306 and a rafter 307. Here, a mounting bracket 311 is attached to the side element 304 by a plurality of mounting nails 350 (or screws, not shown) through a plurality of openings 312 in the first leg 314 of the mounting bracket 311. The first leg 314 may be received in a recess 304a of the side element 304. However, it is also possible in accordance with the present invention to provide a skylight frame side piece 304 without recess 304a; in such an instance, the mounting bracket 311 or other components may be mounted flush against the skylight frame side piece 304. A mounting nail 320 (or screw, not shown) is inserted through each of the alignment openings 116, 117 (Fig. 12) and is driven through the sheathing 306 and into the rafter 307.

The substantially L-shaped flashing profile 309 is used to obtain a substantially weather-tight connection between the skylight 352 and the surrounding roofing. A first leg 309a is positioned in abutment with the outer wall of the side element 304, and thus overlaps the first leg 314 of the mounting bracket 311. A second leg 309b of the flashing profile 309 is disposed above second leg 315 of the mounting bracket 311 and includes a raised folded portion 309c. The first leg 309a along with the raised folded portion 309c in the second leg 315 forms a channel 340 for transporting water along the side element 304 of the skylight frame 301.

A flexible section 310 is retained on one end in the raised folded portion 309c. For instance, the flexible section 310 may be retained in the raised folded portion 309c by crimping, adhesion, or by a combination of crimping and adhesion. As such, the flexible section 310 and the raised folded portion 309c may be crimped along the entire length of the flashing profile 334, 338 (Fig. 17) or along any amount of length thereof. In accordance with one exemplary embodiment of the present invention, the flexible section 310 is crimped along the entire length of the flashing profile 334, 338 (Fig. 17) except for the last 6 inches on the ends of the flashing profile 334, 338.

The flexibility of the flexible section 310 allows for the flashing profiles 334, 338 along with the rigid flashing profiles 332, 336 and any number of mounting brackets 311 to be pre-mounted on the skylight 352. During installation of the skylight 352, the flexible section 310 is lifted as shown in Fig. 18, which will reveal and provide access to mounting bracket 311. Mounting means, such as the mounting nail 320, may be inserted through the alignment openings 116, 117 (Fig. 12) of the second leg 315 of each mounting bracket 311 as described above. Once the mounting means are driven into the underlying roof supporting structure, such as the sheathing 306 and the rafter 307, the flexible section 310 is released and is brought to a position in which it substantially overlaps the entire length of the second leg 315 of the mounting bracket 311. Incorporation of the mounting bracket 311 allows for insertion of a fastener 320 into the sheathing 306 and the rafter 307, providing for a more secure attachment of the skylight 352 without the need for puncturing the flexible portion 310 with the fastener 320. In such an

arrangement, a larger opening of the aperture 8 (Fig. 1) may be realized for use with the skylight 352.

In accordance with the exemplary embodiment shown in Fig. 18, a seal 351 may be provided between the sheathing 306 and the side element 304. The seal 351 may provide for a further barrier to keep unwanted wind, water, and other elements from entering or exiting the interior of the building through the skylight. It is to be understood that in other exemplary embodiments of the present invention, the seal 351 is not illustrated but may be utilized if desired or appropriate; use of seal 351 in the present invention is not limited to the embodiment depicted in Fig. 18. Seal 351 provides for airtightness between the sheathing 306 and the side element 304, to avoid for example humid indoor air escaping and, upon reaching for example second leg 315 which may be cooler from outside temperatures, condensing to undesirable liquid water. Seal 351 also prevents air flow from outside a structure to inside a structure resulting from pressure differentials between the inside and outside, caused for instance by wind; such air flow has been found sometimes to be accompanied by undesirable water flow that can stain or deteriorate interior building components. Seal 351 may be attached to side element 304 by tacking, nailing, stapling, adhesives, or other methods. Attachment leg 353 may be included with seal 351 for attachment by such methods to side element 304. Because of variations in the space between side element 304 and sheathing 306 about a skylight, caused for example by placing rigid flashing profile 336 on top of one or two courses of roofing shingles but placing rigid flashing profile 332 directly upon sheathing 306 (or upon tar paper installed upon sheathing 306, not shown), it has been found that seal 351 may be formed of a compressible material allowing effective sealing notwithstanding such variations, such as compressible foam or elastomeric, such as for example SANTOPRENE® thermoplastic elastomer by Advanced Elastomer Systems, L.P. Seal 351 may be constructed and sized so as to adapt to variations of spaces between side element 304 and sheathing 306 about skylight frame 201 (Fig. 14), such as from about 2 millimeters to about 9 millimeters, and yet still provide an effective seal therebetween. As described, seal 351 may be formed of a compressible material, yet attachment leg 353 may be formed of comparatively stiffer material; so configured, seal 351 may adapt to variation in spaces as

described yet attachment leg 353 may resist substantial displacement of the predetermined position of seal 351between the sheathing 306 and the side element 304.

The flashing profile 334, 338 may have a turned down end 330 located on one end thereof in certain exemplary embodiments. The turned down end 330 allows for shingles to be located over the rigid flashing profile 332 to the location of turned down end 330. Shingles may also be located over the flashing profiles 334, 338 in various exemplary embodiments. Also, the rigid flashing profile 336 has no shingles located on top of the rigid flashing profile 336 in accordance with various exemplary embodiments. The flashing profile 334, 338 has a rigid section 342 located on at least the second leg 309b of the flashing profile 309. In certain exemplary embodiments of the present invention, both the first leg 309a and the second leg 309b of the flashing profile 309 are rigid.

The use of the brackets 311 and the flashing profile 309 provides for an improvement over prior art structures in that substantial space may be saved in the overall assembly of the skylight, and such space savings helps to keep the skylight 352 to be of a larger size, which is generally desired by users of skylights.

It should be understood that the present invention includes various modifications that can be made to the embodiments of the skylight described herein as come within the scope of the appended claims and their equivalents.